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IS 7125 (1974): Technical supply conditions for carpenters' braces [PGD 6: Earth, Metal And Wood Working Hand Tools]

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UDC 674·055 : 621·951·5 : 381·717

IS : 7125 - 1974

(Reaffirmed 1998)

Indian Standard

TECHNICAL SUPPLY CONDITIONS FOR CARPENTERS' BRACES

1. Scope — Covers the technical supply conditions for carpenters' braces.

2. Types — The braces shall be of the following types:

a) Carpenters' plain brace
b) Carpenters' ratchet brace
c) Carpenters' corner brace

3. Definitions — *See* Fig. 1, 2, 3 and 4.

3.1 *Brace* — A cranked or levered hand tool designed primarily for rotating auger bits and bit stock drills.

3.2 *Sweep* — Twice the throw of lever or sweep arm.

3.3 *Nominal Size* — A value equal to the sweep.

3.4 *Chuck Assembly*

3.4.1 *Shell* — The outer component of the chuck which is threaded internally to fit the screw end and formed externally (knurled, hexagon or octagon) for manual operation. The shell forms the outer housing for the hardened jaws and provides the means by which the jaws are caused to grip the tools.

3.4.2 *Screw end* — The component threaded externally to accept the shell and designed to form the inner housing for the jaw assembly, the outer housing being formed by the shell. The screw end is fitted to the ratchet body assembly (in ratchet type braces) or to the frame.

3.4.3 *Jaws* — The component designed to fit into and operated by shell, and intended to accommodate and grip the square taper tangs of bits.

3.4.4 *Jaw spring* — The spring which secures the jaws together in pairs and provides the necessary tension for the automatic spreading as the chuck is opened.

3.4.5 *Knurled thrust washer* — It acts as a wearing pad between the screw end and the ratchet body.

3.5 *Nose* — The component secured to the sweep arm which has a square tapered hole for the receipt of auger bits and similar other bits, the tangs of which are locked in position by the thumb screw provided in nose.

3.6 *Ratchet Body Sub-assembly* — A sub-assembly comprising the following components.

3.6.1 *Rack* — The circular toothed member actuated by the pawls through which the torque is applied.

3.6.2 *Ratchet body* — The component designed to accommodate the screw end, ratchet, pawls and pawl spring.

3.6.3 *Ratchet pin* — The pin used to secure the ratchet to screw end.

3.6.4 *Pawl spring* — The helical spring which ensures that the pawls engage in the ratchet.

3.6.5 *Pawls* — The components controlled by the cam ring which actuate the ratchet.

3.6.6 *Pawl pins for screws* — The component used to secure the pawls to the ratchet body.

3.7 *Cam Ring* — The component having an eccentric grove in the bore for selecting the action of pawls. It is knurled to provide manual adjustment.

3.8 *Cam Stop Pin* — The pin functioning as a positive stop during rotation of the cam spring.

Hand Tools Sectional Committee, EDC 12; Wood Working and Carpenters' Tools Subcommittee, EDC 12 : 6 [Ref: Doc: EDC 12(2057)]

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3.9 *Sweep Arm Sub-assembly* — A sub-assembly comprising the following components.

3.9.1 *Sweep arm* — The cranked component carrying the handle on which the ratchet body and head sub-assembly are mounted.

3.9.2 *Handle* — The component set in the centre of the frame providing a freely revolving hand grip for rotating the brace.

3.9.3 *Handle collars* — The collars secured to the sweep arm providing a correct location for the handle.

3.10 *Ball Cup* — The components attached to the end of the sweep arm which provides both a bearing surface and a housing for the hardened balls.

3.11 *Ball Thrust Washer* — The retaining washer which provides a bearing surface and which acts as a thrust pad between the head sub-assembly and the balls.

3.12 *Head Sub-assembly* — A sub-assembly of the following components.

3.12.1 *Quill disk* — The circular plate secured to the quill hub and formed to provide the housing for the head.

3.12.2 *Quill hub* — The component fitting and revolving freely on the end of the sweep arm, forming a mounting for quill disk and head.

3.12.3 *Quill washer* — The U-shaped washer which secures the head sub-assembly to the sweep arm.

3.12.4 *Head* — The component through which pressure is applied.

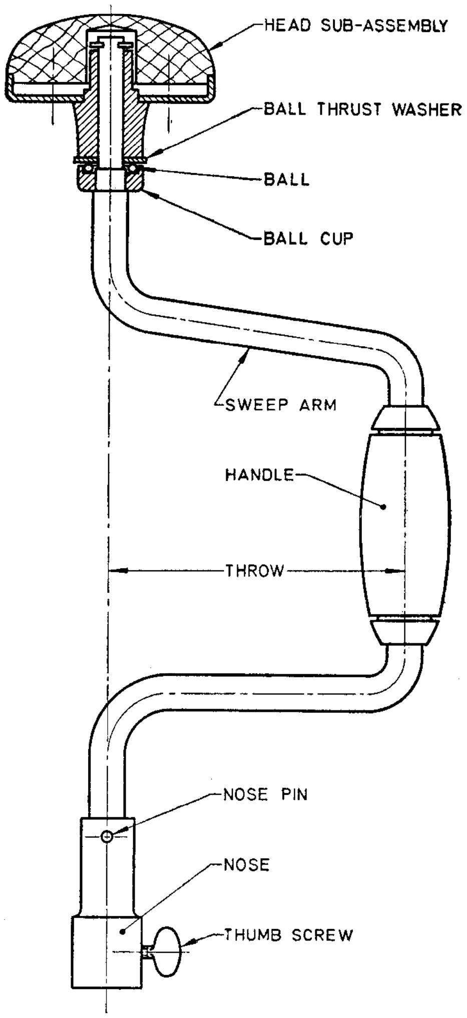

FIG. 1 NOMENCLATURE OF PLAIN BRACE

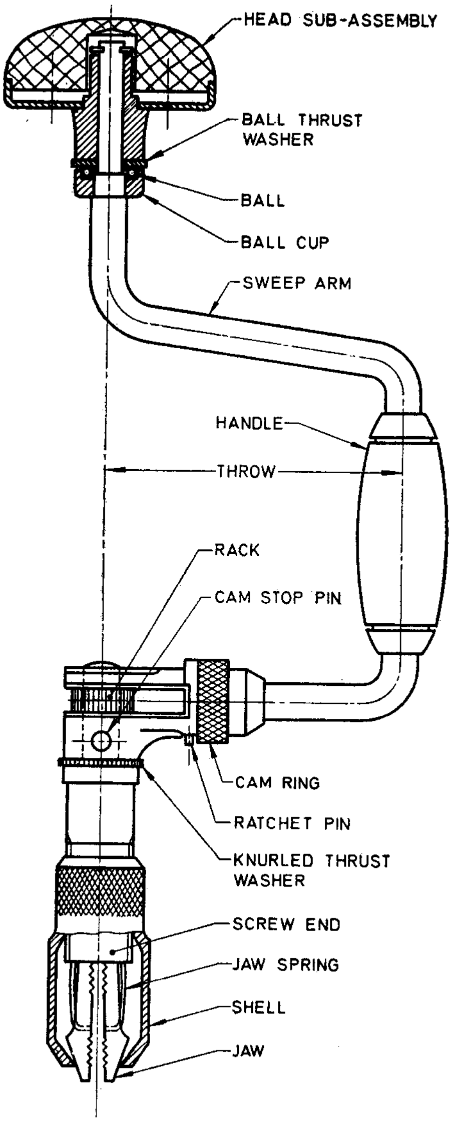

FIG. 2 NOMENCLATURE OF RATCHET BRACE

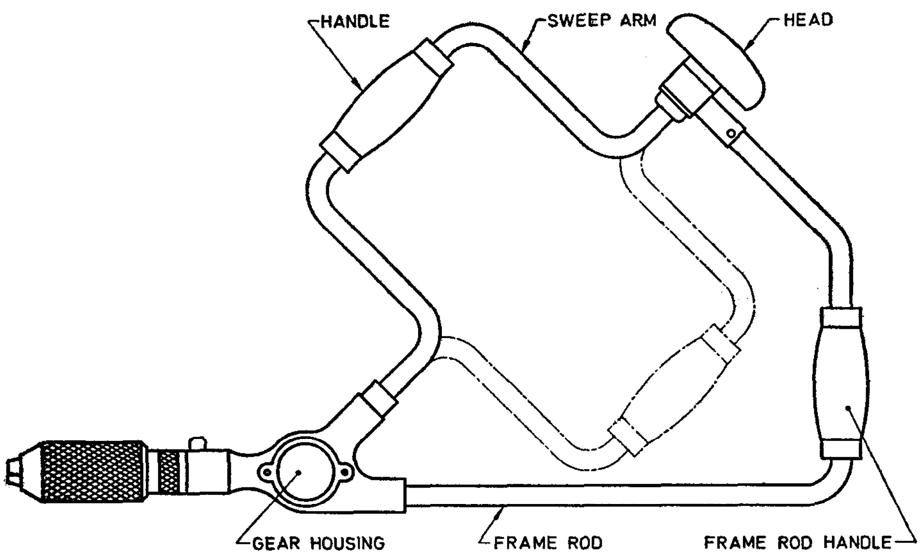

FIG. 3 NOMENCLATURE OF CORNER BRACE

4. Material—Suitable material meeting with the requirements laid down in **5** and **7**. Following are some examples of suitable materials for some of the components:

Components	*Material*
Jaws, pawl and gears	T80 of IS : 1570-1961 'Schedules for wrought steels for general engineering purposes'
Jaw spring and pawl spring	Grade 2, C70 of IS : 4072-1967 'Specification for steel for spring washers'
Shell and nose	Malleable iron complying with IS : 2107-1962 'Specification for whiteheart malleable iron castings' or IS : 2108-1962 'Specification for blackheart malleable iron castings' or suitable steel conforming to IS : 1570-1961
Pawl pin	C10 of IS : 1570-1961
Thumb screw	Malleable iron complying with IS : 2107-1962 or IS : 2108-1962 or from steel wire having a tensile strength of not less than 375 N/mm^2 (38 kgf/mm^2 Approx)
Ratchet body	Malleable iron complying with IS : 2107-1962 or IS : 2108-1962 or from steel to designation 13S 25 of IS : 1570-1961
Hardened balls	105Crl of IS : 1570-1961
Handle and head	Rosewood (*Dalbergia latifolia* Roxb.) (*see* IS : 620-1965 General requirements for wooden tool handles) or from plastic meeting the tests specified in **8.6**
Gear housing	Malleable iron complying with IS : 2107-1962 or IS : 2108-1962 or from suitable steel complying with IS : 1570-1961

5. Hardness

Jaws, pawls, gears, ball thrust washer and pawl pin	550 to 650 *HV*5; case depth 0·25 mm *Min* [*see* IS : 1501-1968 Method for Vickers hardness test for steel (*first revision*)]
Jaw spring and pawl spring	450 to 550 *HV*

6. Manufacture

6.1 The jaws shall always be supplied in pairs. Each shall be formed in such a manner that, when paired together, the faces shall meet uniformly in a common plane and the opposed jaws shall mate.

6.2 The chuck shall be capable of accurately and securely gripping the tangs of bits by hand tightening only; at the same time having an annular clearance between the end of the jaws at the outer end of the shell and the parallel portion of the bit as indicated in Fig. 4.

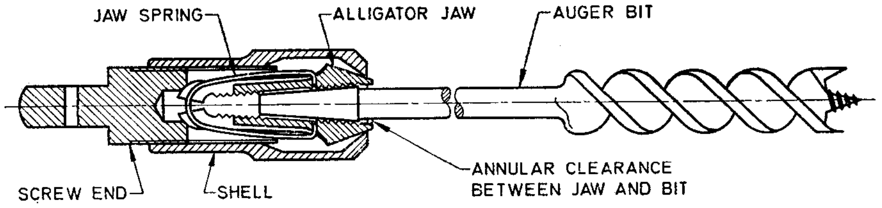

FIG. 4 SECTIONAL VIEW OF BIT BRACE CHUCK WITH AUGER BIT IN POSITION SHOWING ANNULAR CLEARANCE

6.3 The threads on the spindle shall be concentric with the spindle within 0·5 mm total indicator reading, throughout the entire length of the thread. The spindle or screw end shall be provided with a slot of sufficient depth to receive the chuck jaws.

6.4 The ratchet mechanism shall be manually operated with means provided for permitting the selection of directional rotation of chuck. When the ratchet is positioned for right or left hand rotation, the chuck shall rotate in right or left hand direction respectively. There shall be no movement of the chuck when the sweep arm is rotated in the other direction. The ratchet mechanism shall be provided with a lock position for permitting a direct rotational drive of the chuck with either hand rotation of the arm.

6.5 The tooth contact on the face width of bevel gears, used in corner brace shall not be less than 5 mm with a backlash of not more than 0·3 mm.

6.6 The housing, for the bevel gears for corner brace, shall be designed to completely enclose the two bevel gears and provide an adequate seal against dirt and grit. The housing shall be permanently secured to the frame rod. The frame rod shall be one piece of solid steel of strong and durable construction.

7. Workmanship and Finish

7.1 All component parts of braces shall be free from cracks, burrs, seams, pits, scales, fins and other forging or casting defects. The braces shall be brightly and smoothly finished and shall work freely without any stiffness or undue play after assembly.

7.2 All metal components with the exception of pawls, pawl pin, jaws, *U*-washers, springs and balls shall be nickel-chromium plated in accordance with IS : 1068-1968 'Specification for electroplated coatings of nickel and chromium on iron and steel'.

7.3 The handles and head shall be smoothly finished and when manufactured from wood shall subsequently be coated with clear polish or lacquer, to produce a glossy surface. The handle and the head after inspection but before fitting to the metallic components shall be treated by dipping in 10 percent (by mass) solution of copper naphthenate in white spirit for 10 seconds or in copper naphthenate dispersion in aqueous ammonia for one minute.

8. Tests

8.1 *Holding Capabilities*

8.1.1 *Braces using chuck* — The chuck shall accept any standard auger bit having a square taper tang. The chuck shall then be locked by normal manual operation. It shall not be possible manually to withdraw the bit. The chuck shall unlock easily by normal manual torque, with no mechanical assistance, and shall be possible to withdraw the bit without hindrance.

8.1.2 *Braces using nose* — The nose shall accept any standard auger bit having square taper tang. It shall then be possible to lock the tool in the nose by means of the thumb screw. The bit shall not drop from the nose when the brace is held vertically, nose down.

8.2 *Functioning* — With any one of the bits of the largest size mounted in the chuck. The braces shall be used on rosewood (*Dalbergia latifolia* Roxb.) at least 5 mm thick. It shall function satisfactorily without any damage or defect during or on completion of the test.

8.3 *Compression Test* — Each of the sample brace shall be placed in a vertical position and a load of 90 N ($\approx$ 9 kgf) shall be applied to the top face of the head in the direction of the longitudinal axis of the chuck or nose. The measurement of the overall length from the outermost end of the chuck or nose to the top face of the head shall be made. The contraction in this dimension shall not exceed 11 mm when the load is increased to 900 N ($\approx$ 90 kgf) for 125, 200 and 250 mm nominal size braces and 670 N ($\approx$ 67 kgf) for 300 and 350 mm nominal size braces. A permanent set of not more than 1·2 mm shall be allowed when the load is decreased to 90 N ($\approx$9 kgf).

The corner braces shall also be tested in above manner except that the load shall be applied to the top face of frame rod.

8.4 *Torque and Ratchet Machanism Test* — A standard auger bit shall be gripped in the chuck or nose of the brace, with the outer end of the bit clamped in a bench vice. The head of the brace shall be supported and the handle placed in a horizontal plane. A vertical load of 360 N (≈36 kgf) shall be applied at or near the centre of the handle for each ratchet position. No failure, perceptible deformation or damage to ratchet brace shall occur in any of the ratchet positions.

8.5 *Concentricity of Brace* — The fixtures employed to determine the concentricity shall consist of a table or plate, block and mandrel. The block shall be secured to the plate and provided with a hole to receive the mandrel. The mandrel shall be of the same diameter as the sweep arm and allowed to rotate in the block. The chuck or nose of the brace shall be tightened on the mandrel as illustrated at point 1 in Fig. 5 with the sweep arm in an upright position. The brace shall be tightened on the mandrel so that the indicator height reading for the distance from the table or plate to point 1 shall be approximately the same distance at point 2. With the indicator at point 2, the sweep arm shall be revolved 360° and the concentricity of the brace shall be within 6·5 mm total indicator reading.

Note — The above test is not applicable to corner braces.

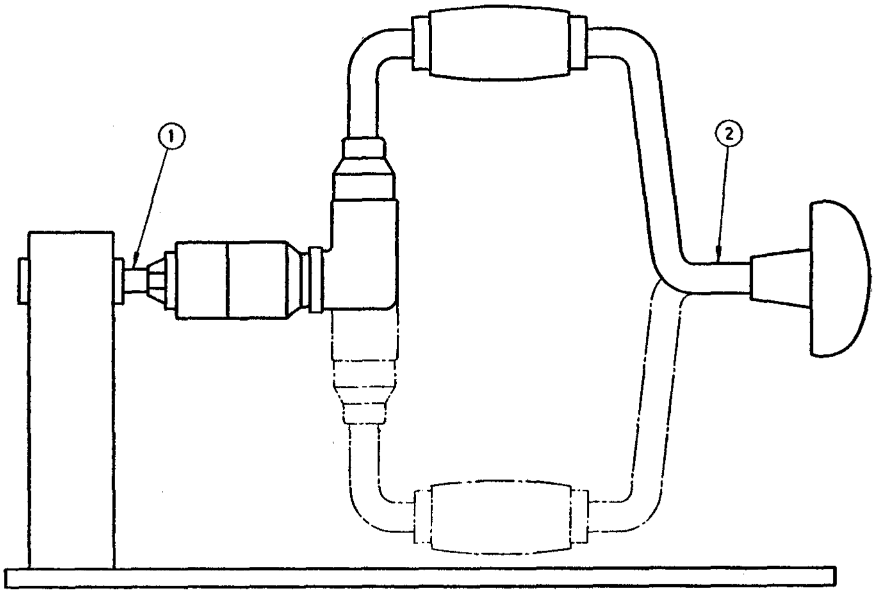

FIG. 5 TEST SET UP FOR CHECKING CONCENTRICITY OF BRACE

8.6 *Plastic Head and Handle*

8.6.1 *Head distortion test* — The head and the handle shall completely be immersed in boiling water at 100°C for a period of 2 minutes. At the end of this period, the brace shall be taken out. It shall show no signs of distortion or blistering.

8.6.2 *Flammability test* — The sweep arm of the brace shall be supported with head and handle extended outward in a horizontal position. The head and handle shall be covered with a piece of Bunsen burner gauze in a horizontal position 6·5 mm below the bottom of head and handle and with about 12·5 mm of head and handle extending beyond the edge of the gauze. A Bunsen burner with a flame 12·5 mm to 19 mm high shall be adjusted to just touch head and handle. At the end of 30 seconds, the flame shall be removed and head and handle allowed to burn. The rate of travel of the flame shall be determined from the time required for the flame to travel the length of the head and handle after the removal of Bunsen burner.

In case the head and handle do not continue to burn after the first ignition, again repeat the procedure for 30 seconds. If the head and handle stop burning before the flame reaches the end of the head and handle, the sample shall be considered as self-extinguishing. When tested as specified, the plastic head and handle shall not burn at a rate exceeding 50 mm per minute.

9. Preservation and Packing — The braces shall be clean, dry and free from all traces of rust and foreign deposition, before they are treated with suitable preservation. They shall be packed in accordance with best prevalent trade practice.

10. Sampling — Unless otherwise agreed to between the buyer and the seller the procedure given in IS : 2500 (Part I)-1963 'Sampling inspection tables: Part I Inspection by attributes and by count of defects' may be followed for sampling inspection, the sampling plans for various characteristics being according to **10.1** and **10.2**.

10.1 For dimensions, workmanship and finish and general requirements, single sampling plan with inspection level III and acceptable quality level (AQL) of 2·5 percent [*see* Tables 1 and 2 of IS : 2500 (Part I)-1963] shall be followed.

10.2 For hardness and tests single sampling plan with inspection level I and acceptable quality level (AQL) of one percent [*see* Tables 1 and 2 of IS : 2500 (Part I)-1963] shall be followed.

11. Marking — Each brace shall be marked with nominal size, manufacturer's name, initials or recognized trade-mark, and the year of manufacture.

11.1 *ISI Certification Marking* — Details available with the Indian Standards Institution, New Delhi 110001.

EXPLANATORY NOTE

While preparing this standard assistance has been derived from the Specification issued by Chief Inspectorate of General Stores, Kanpur on the subject and the following publications:

BS 1978 : 1965 Bit braces. British Standards Institution.

GGG-B-671e Brace, bit, ratchet; brace, bit, corner; and extensions, bit. US Federal Supply Service.

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